DOCUMENT RESUME

ED 174 933 CG 013 738

AUTHOR Jordan, Valerie Barnes; Brownlee, Linda
TITLE Summary and Review: Correlational Studies of Piagetian Tasks and Various Measures of Reading Achievement.
PUB DATE Feb 79
NOTE 15p.; Paper presented at the International Interdisciplinary UAP Conference on Piagetian Theory and Its Implications for the Helping Professions (9th, Los Angeles, California, February 2-3, 1979)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Correlation; *Developmental Tasks; Elementary Education; Elementary School Students; *Measurement Instruments; *Performance Factors; *Reading Achievement; Reading Tests; Statistical Analysis; *Student Behavior; *Task Performance
IDENTIFIERS *Piagetian Tasks

ABSTRACT

The relationship between performance on various Piagetian and reading achievement tasks as examined through 26 correlational studies is reviewed. The following areas of concern are addressed: (1) sample characteristics of the subjects; (2) classification of the Piagetian tasks into five categories of logical operations, spatial concepts, general concrete operational batteries, formal operations, and conservation; (3) classification of reading tests as reading readiness, reading skills, and language tests; and (4) study results indicating a moderate relationship between the two tasks. (Author/HLM)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED174933

SUMMARY AND REVIEW: CORRELATIONAL STUDIES OF PIAGETIAN TASKS AND VARIOUS MEASURES OF READING ACHIEVEMENT

Valerie Barnes Jordan
University of California, Riverside

and

Linda Brownlee

University of California, Riverside

Paper presented at Ninth Annual Conference on Piagetian Theory and the Helping Professions

Los Angeles, February, 1979

CG013738

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Valerie B. Jordan

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Correlational Studies of Piagetian Tasks

and Measures of Reading Achievement

This paper reviews the literature on the relationship between performance on various Piagetian and reading achievement tests. Although Piaget has not addressed this relationship, Piagetian researchers have applied his theory to the development of reading skills. The ability to conserve, or to recognize the logical invariance of a particular concept despite changes in the relationships between objects, is necessary for the acquisition of many concepts, and it is conceivable that it is also important in the reading process. Previous research has reported moderate relationships between Piagetian tests and IQ,MA, chronological age, and arithmetic achievement (Jordan & Jensen, 1979; Jordan & Jordan, 1975), so it seemed appropriate to document the relationship between Piagetian and reading achievement tasks.

Piaget's extensive writings concerning the development of cognitive processes and their concomitant reflection in oral language can be extrapolated to the acquisition of written language as well.

Some parallels between logical thought structures and certain reading skills are:

1. An understanding of the invariance of sentence meaning despite changes in the surface structure of the sentence. This reflects an understanding that changes such as active-passive transformations do not alter the meaning of the sentence.

2. An understanding of the classification of letters into common characteristics. This reflects an understanding that the same letter can be classified as an upper or lower case letter.

3. An understanding of the heirarchical and multiple classification of

words. This reflects an understanding that the same word may have more than one attribute and different meanings in different contexts.

4. An understanding of the seriation of word order. This reflects an understanding that the sequence of letters in a word, or words in a sentence, determines the meaning of those letters and words.

Two types of research studies have compared the relationship between Piagetian and reading achievement tests. One type has compared the conservation ability of good readers to that of poor readers, or has compared the level of reading ability among conserving and nonconserving children. A search of the literature so far has located eight studies of this type, five of which reported significant differences between these groups with the differences favoring the conservers or good readers. The second type has examined the relationship between Piagetian and reading tests through correlational methods. Since these studies were more numerous than the comparative ones, the remainder of this paper summarized the findings from these correlational studies.

Method

Sample

The basic unit of analysis was groups of students drawn from studies which met the following criteria:

1. Only studies in which Piagetian tasks were administered to intellectually normal children from the preoperational to the formal operational period were included.
2. Studies were not restricted in range of IQ. Studies which involved only retarded or only gifted children, or those within the IQ range

of 90 to 110 were not included. However, only 13 of the 26 studies included reported any information concerning IQ characteristics of their samples.

3. The age range of the subjects was continuous. For example, if a study tested children in kindergarten, second, and fourth grades, but used correlations for the entire group, these data were not included. However, if separate correlations were reported for each of these groups, they were included as independent samples.
4. The relationship between Piagetian and reading tests was reported as product-moment correlations. Studies which used rank-order correlations, biserial correlations, and the like, were not included.

On the basis of these criteria, 26 studies have been obtained at this time for this analysis, and from these studies data for 30 independent groups representing some 2500 children were available. Summary statistics for this group are reported in Table 1.

Table 1 Here

The children in these various samples covered every grade level from kindergarten through high school, although the majority of studies concentrated on the primary grades, and 22 studies consisted of students at only one grade level.

As part of the sample characteristics, both the mean age and age range were obtained and converted into months for each study which provided this information. However, 13 of the 26 studies reported the age range of the children only in terms of grade levels, without any corresponding chronological age equivalents. For these studies, the mean age and age range of the children

were estimated by converting each grade level into a 12 month age range. The first grade was estimated as 72 to 84 months, the second grade as 84 to 96 months, and so on. The mean ages for these studies was estimated by using the midpoint of the converted age range. This procedure may have over- or under-estimated either or both of these variables to some extent. However, elimination of these studies would have severely limited the number of groups available for this analysis.

Classification of Piagetian Tasks

To summarize the various types of Piagetian tests, five main categories for tests of concrete and formal operations were established:

Conservation. This contained subcategories for area, length, quantity, volume and weight. A subcategory for general conservation batteries was also included for studies which reported total scores on the Goldschmid-Bentler Concept Assessment Kit, or scores based on a combination of two or more conservation tests selected by the original authors. A subtotal for all conservation correlations across each group of subjects was calculated, averaging correlations within a study if more than one type of conservation test was reported.

Logical operations. This contained subcategories for class inclusion, classification, relativity, seriation, transitivity, and a general logical operations battery which contained a combination of two or more logical operations tasks.

General concrete operational batteries. This contained batteries of tests that combined conservation, logical operations and other concrete operational tests, and yielded a single score across all these tasks.

Spatial concepts. This contained tests of spatial perspectives.

Formal operations. This contained tests of chemistry, correlation and

combinations of formal operational tests.

Since there were so few studies in these last three categories, the averaged correlations for these categories are not discussed here. Within a particular study, if more than one correlation was available within any of these categories, then these correlations were averaged within that study. Once averaged correlations within studies were obtained, then correlations were averaged across studies, using Fisher's r-to-z transformations which weights each correlation by the sample size on which each separate correlation was based.

Classification of Reading Tests

A wide range of standardized reading tests scores was reported in the studies, so these tests were grouped into three main categories. The first was standardized tests of reading readiness, such as the Gates-MacGinitie and Metropolitan Reading Readiness tests. The second was standardized tests of reading skills, such as the C.A.T., M.A.T., and Gates-MacGinitie, and included subcategories for vocabulary, comprehension, and word analysis skills. The third was standardized language tests, such as the C.A.T., and included subcategories for spelling and grammer. A subtotal for each reading category, as well as a total across all reading categories was obtained for each sample.

Results and Discussion

The averaged correlations for conservation and logical operations with standardized tests of reading achievement are illustrated in Figure 1.

Figure 1 Here

In general, correlations with Piagetian tests were higher among the reading readiness and language skills categories than among the reading skills category. The Piagetian task which yielded the highest averaged correlation across all reading categories was seriation (averaged $\underline{r}$ = .62), followed by general concrete operational batteries (averaged $\underline{r}$ = .55) and averaged logical operational batteries (averaged $\underline{r}$ = .47).

General reading correlated .41 with general conservation batteries, .35 with conservation of number, and .34 with conservation of area. With the exception of seriation, the highest correlation between Piagetian tasks and reading achievement occurred with batteries consisting of several Piagetian tasks. It is not surprizing that a battery of tests yields higher correlations than individual conservation or logical operations tests, so the superiority of the general conservation or concrete operational batteries can be partly attributed to the large number of tests included in this category. In general, correlations between tests of logical operations and reading were higher than those between conservation and reading.

Within types of reading, it appears that readiness, word analysis skills, and spelling are more highly related to Piagetian performance than vocabulary and comprehension. It is interesting that skills pertaining to the mechanics of reading correlate more highly than actual comprehension of the material to be read.

The total averaged correlation across all Piagetian and reading categories, based on 30 groups, was .43 which accounts for approximately 18% of the variance. By way of comparison, the averaged correlation between a variety of arithmetic categories across the same Piagetian categories, based on a separate review of 25 groups, (Jordan & Jensen, 1979), is .50 which accounts for 25% of the variance. These two sets of correlations are similar, and

indicate that Piagetian tests can account for about one quarter of the variance in achievement test performance. It is also interesting to compare the relationship between Piagetian tasks and achievement tests with the relationships between Piagetian and intelligence tests. The averaged correlations between IQ and MA with the same Piagetian categories, based on another separate review of 37 groups (Jordan & Jordan, 1975) are .33 and .48 respectively. It appears that Piagetian tests are more highly correlated with achievement, than with intelligence tests. However, to complete this comparison, the size of the relationship between achievement and intelligence tests should be considered. It is frequently reported in the literature that the correlation between intelligence and achievement tests is at least .50 or higher. There were four studies which reported correlations between Piagetian and intelligence tests in addition to the correlations between Piagetian and reading achievement tests, and the Piagetian-intelligence test correlations tended to as high or higher than the Piagetain-reading test correlations. However, the small number of studies reporting partial correlations between Piagetian and reading achievement tests, eliminating the contribution of IQ, precludes a more precise estimate at this time of the Piagetian-reading achievement relationship, independent of intelligence. It would be desirable for future studies to obtain information not only on Piagetian and achievement tests, but on intelligence tests as well, so that the independent contribution of Piagetian performance on achievement performance can be measured.

In conclusion, these correlational data suggest that a moderate relationship exists between Piagetian and reading achievement tests. It appears that the mechanics of language and grammar correlate more highly than do comprehension and vocabulary with Piagetian performance. It is likely that certain

Piagetian tasks may make a necessary but not sufficient contribution to various reading processes. It is suggested that the diagnosis of Piagetian performance may be particularly useful for children with reading problems as an alternative method for the assessment and remediation of reading deficiencies.

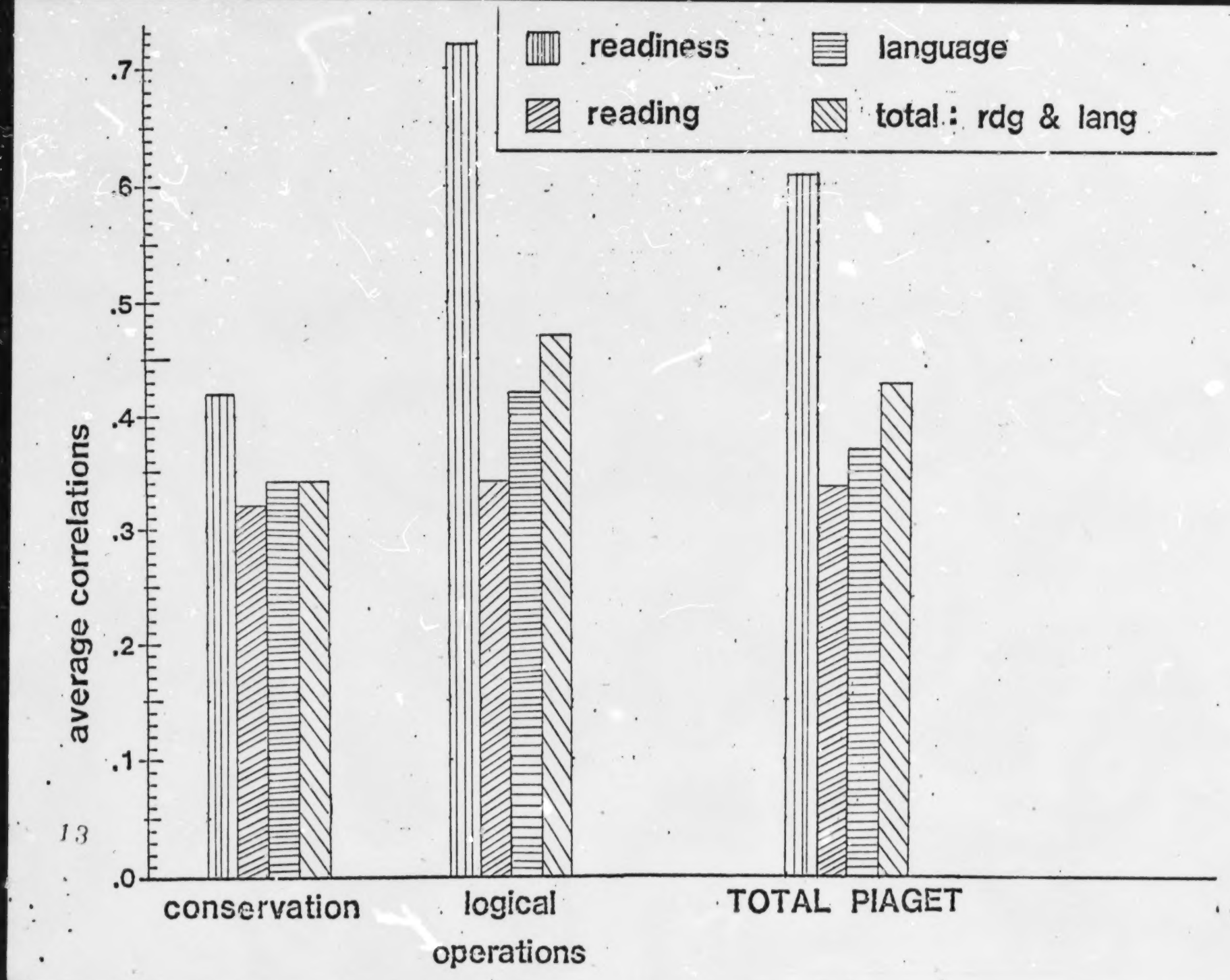
References

Jordan, V.B., and Jensen, C.M. Summary and Review: Correlational studies of measures of Piagetian cognitive development on math achievement. Paper presented at the ninth annual conference on Piagetian theory and the Helping Professions, Los Angeles, February 1979.

Jordan, V.B., and Jordan, L.A. Relative strengths of IQ, mental age and chronological age for predicting performance on Piagetian tests. Paper presented at the biennial meeting of the Society for Research in Child Development, Denver, April 1975.

FIGURE

1. Size of averaged correlations between Piagetian and reading achievement tests.


readiness
language
reading
total : rdg & lang
average correlations
.7
.6
.5
.4
.3
.2
.1
.0
conservation
logical operations
TOTAL PIAGET

Correlational Studies of Piagetian

and Reading Achievement Tests

Table 1

Summary Statistics of Group Characteristics

	Size of Age Range	Average M Age	Average M IQ
Mean	18	93	108
Range	12-53	60-212	75-145

Note: Chronological ages are reported in months.